BOSTON FLOUR MILL, WATERWORKS SYSTEM
(Thompson Flouring Mill)
(Thompson's MIlls)
32655 Boston Mill Drive
Shedd
Linn County
Oregon

HAER OR-183-B
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PHOTOGRAPHS

WRITTEN HISTORICAL AND DESCRIPTIVE DATA

FIELD RECORDS

HISTORIC AMERICAN ENGINEERING RECORD
PACIFIC WEST REGIONAL OFFICE
National Park Service
U.S. Department of the Interior
1111 Jackson Street, Suite 700
Oakland, CA 94607

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HAER No. OR-183-B

Location: Shedd, Linn County, Oregon
Township 13 South, Range 03 West, Section 08
UTM 10 493650 4922900
Latitude: 44.461226345; Longitude: -123.08100617

Present Owner & Occupant: Oregon Parks & Recreation Department (OPRD)

Significance: The Boston Flour Mill **(**Thompson's Mills) is listed in the National Register of Historic Places for its association with the early flour-producing industry in the Willamette Valley. The first mill was constructed in 1858, only to burn down four years later. Rebuilt in 1863, the oldest part of the mill stands at the center of a structure that expanded in increments over a period of seventy years. The waterworks system consisting of a network of ditches and dams controlled the Calapooia River flow, directing it toward the mill. For more than 150 years it was essential to the operation of the mill, initially for flour and grain production, and then to produce electricity.

Preparers: Julie Osborne, Preservation Specialist, OPRD

Project Information: This document was prepared to satisfy a stipulation in the Memorandum of Agreement between the Federal Energy Regulatory Commission (FERC), OPRD, and the State Historic Preservation Office, because the property was adversely affected by the surrender of exemption for the Thompson's Mills Hydroelectric Project (FERC No. 9169) and the removal of the Sodom and Shearer dams. This documentation includes written historical and descriptive data of the entire waterworks system.

Part I. Historical Information

A. History:

Richard Finley established water rights to the Calapooia River in 1858 which consisted of two power, or hydro-mechanical rights, and one irrigation right. These rights allowed the mill to control about 7% of the Calapooia River waters for approximately 150 years. [1] They provided the necessary supply of water to operate the mill, but also created controversies with surrounding land owners who wanted water for irrigation purposes.

When the mill machinery was converted to electric motors during the post-World War II-era, use of the water rights became an option rather than a necessity. Consequently, the Thompson family initiated the creation of the Calapooia Irrigation District (a taxing district) in the 1950s. Water use agreements were developed whereby they were paid not to run the mill on waterpower during the summer irrigation season, and irrigators upstream used the water that would otherwise have been made available for operation of the Mill. The irrigation district payments helped defray the cost of the mill's electric bill. The agreement continued in different forms until 2004.

Both state and federal governments, as well as private parties questioned and challenged the mill's water use and dam management practices. OPRD's 2004 purchase of the mill and its water rights effectively ended the water disputes when OPRD terminated the mill's power sales agreement in 2005.

1. Dates of Construction and General Descriptions:

Waterworks System Components: [2]

A system of waterways, dams, control gates, ditches and dikes have diverted water from the Calapooia River to Thompsons Mills' head gates since 1858. The primary components of the waterworks system includes the bifurcation of the Calapooia River and Sodom Ditch, the Sodom Ditch, the Sodom Dam, the Shearer Dam, the Spillway Dam, the Upper Millrace Channel, the millrace, and the tailrace. The waterworks system is spread out over a distance of about six and one-half miles adjacent to and east of the Calapooia River. (See Appendix A)

Bifurcation: The bifurcation is a branch in the Calapooia River signifying the start of the Sodom Ditch. At the bifurcation, a natural arm of the Calapooia River splits and flows to the

[1] The first power water right, Certificate #26506, is for 35 cubic feet per second (CFS), has a priority date of 1858, and is a "territorial water right" predating Oregon's statehood. The right was "decreed", having been adjudicated by the Circuit Court of Linn County in 1957. The second power water right, C#10766, has a 1933 priority date and controls 145 CFS. The final water right, C#14249, has a priority date of 1939 and grants 68 CFS to irrigate 53.7 acres, including 10.8 acres of the mill property.

[2] The descriptions of the water source features are taken in large part from the Calapooia Watershed Council and River Design Group, Inc. for National Oceanic and Atmospheric Administration National Marine Fisheries Service Office of Habitat Conservation. "Biological Assessment for the Removal of Sodom Dam and Shearer Dam." December 2010.

northwest toward Thompson's Mills about six and one-half miles downstream from the bifurcation. The eastern branch from the bifurcation is the Sodom Ditch.

Sodom Ditch: The Sodom Ditch was built in the late 1800s upriver of the mill and is believed to have been excavated to serve as a high water over-flow channel to divert water around the mill and minimize flooding along that portion of the Calapooia River. It is a channel approximately 85' wide and about 18'-20' deep, with a total length of approximately six miles that resembles a natural water course in general appearance. Large boulders of what appear to be basalt, or andesite, have been dumped along the banks of the channel to protect the sides from erosion. Large mature cottonwood trees and other tree and plant species comprise the riparian zone along the channel. As the ditch eroded into the fine valley soils, it became so effective that it began to capture nearly the entire flow of the Calapooia River. The ditch has elevated banks that are 10'-15' high and has replaced approximately ten miles of natural Calapooia River as the primary waterway for river flows and fish migration.

Sodom Dam: The Sodom Dam (removed 2011) was located in the Sodom Ditch approximately 1500' from the bifurcation. It was first built about 1890 to create sufficient head[3] (fluid energy measurement) to back up the water during low flows out of the Sodom Ditch and into the Calapooia River. From about 1890 to 1954, Sodom Dam evolved from a push-up dam that was seasonally installed to divert flows during the summer months, to a more permanent timber crib dam filled with rock ballast. A concrete dam was constructed in 1954 and replaced in 1957 following the dam's failure in 1956. It was approximately 85' across and 8'4" high. The sides of the dam were bounded by concrete abutments that extended to a height of 10' above the crest of the dam. The abutments had concrete wing walls that extended into the stream banks. Flashboards could be added to the dam spillway to raise the water surface in Sodom Ditch. One set of 12" flashboards was typically added to the dam during the irrigation season to cause the reservoir behind the dam to rise, resulting in more water being captured for use at the mill. A pool and weir fish-way was located in the river on the west side of the dam. (See Appendix B)

Shearer Dam: Built in 1890, the Shearer Dam's function was to divert flows from the Calapooia River into the Upper Millrace Channel, a channel that connects with the millrace (also known as Walton Slough). It was located on the Calapooia River at approximately river mile 23 and was designed solely to manage operational flows delivered to the mill. It was the primary diversion dam for Thompson's Mills. Shearer Dam was also a push-up dam later replaced by a timber crib structure and finally a concrete structure in 1956. This concrete structure was 5' in height from the scour apron to the crest of the dam, which is 7.1' higher than the water level in the downstream scour pool under stagnant conditions. Measuring approximately 35' long, the concrete dam included lateral wing walls, a spillway that could be modified with flashboards, and a fish-way in the river on the west side of the dam. The weir and pool fish-way was comprised of three pools 6' wide by 9.5' long by 3' deep. Like the Sodom Dam, the Shearer Dam was removed in 2011 because rock ballast at the outlet that extended above the water level

[3] The term "head" refers to the total energy at a given point in a fluid; it is the energy associated with the movement of the fluid, plus energy from pressure in the fluid, plus energy from the height of the fluid relative to an arbitrary datum.

and the fish-way pool weirs allowed too much water through them, creating hydraulic conditions that inhibited fish passage. (See Appendix C)

Upper Millrace Channel: This connector ditch is approximately 450' long, 30' wide, and 6' deep. It diverges from the Calapooia River upstream from the Shearer Dam and parallels Roberts Road before joining the millrace, which ultimately delivers water to Thompson's Mills. The history of the connector ditch is unknown although it is believed to either have been originally hand dug or was possibly excavated with a horse and plow. Over the years, the connector ditch enlarged likely through natural erosion and possibly through mechanical excavation.

Spillway Dam: The Spillway Dam is a small concrete dam constructed in 1957. The dam is 8'10" high and 38 feet wide and is located on a side channel to the Calapooia River where the Upper Millrace Channel and the millrace meet. It prevents water in the millrace from re-entering the river through a nearby intermittent slough and maintains the water surface elevation to convey flow to the millrace. (See Appendix D)

Millrace: The millrace is more than 60' wide and stretches from the upper millrace channel, under the bridge of Boston Mill Road, and undulates for a distance of approximately one mile from where it splits off and flows toward the deck on the south side of the mill.

Tailrace: The tailrace acts as a spillway for turbine discharge and headgate releases. The water is channeled through the turbines powering the mill and then be returned to the Calapooia River directly below the tailrace.

Part II. Structural/Design/Equipment Information

A. General Statement:

1. Character:

The waterway components of the mill site are located in a rural setting with a mixture of natural foliage and farmed fields. The Calapooia River and waterworks system components combine to form a system for providing water to generate power for Thompson's Mills. These linear features are a combination of natural and human-made elements that illustrate the manipulation of the landscape to direct the water toward the mill. These characteristics retain their location, association, feeling, and design and continue to tell the story of how the mill was powered.

2. Condition of fabric:

The appearance of the waterworks system remains the same except for the removal of the Sodom and Shearer dams. Foliage and natural growth throughout the ditches and along the banks of the river have changed the appearance to some degree as will happen in a natural setting. However, the millrace, millpond and tailrace retain clear of tall vegetation through on-going maintenance.

B. Site:

Thompson's Mills is located in Linn County, one and one-half miles east of Shedd, Oregon, off Highway 99E, and six miles east of the Willamette River. The general landscape of the Willamette Valley in the vicinity of the mill is of flat agricultural fields, mostly used for the production of grass seed. It is rural in nature and limited farmstead development is in the vicinity.

Part III. Operations and Process

The selection of this site for the mill presented significant challenges because it was placed in an area that averaged 5' of fall per river mile. However, through an extraordinary feat of engineering accomplished by strategic placement of dams and ditches, the owners of the site were able to change the fluid energy measurement, or head, so that there were maximum flows during summer months, and minimal flows during winter months. This allowed peak winter flows to primarily bypass the mill site, in turn reducing the height and duration of flooding.[4]

The way in which the mill gains and regulates water flow from the Calapooia River is complicated and relies on three dams, a high water diversion "ditch", a connector channel, and the millrace. The Sodom Dam was used to keep water in the river channel before later diverting it toward the mill. The Shearer Dam backed up water and delivered flow via a bypass channel sending it into the millrace. The Spillway Dam maintains the elevation of the water and conveys flow to the millrace. At the end of the millrace (approximately a mile from the Calapooia River) the water reaches the mill head gates. The four wooden head control gates at the mill allow the mill's manager to control the water surface in the millrace. Historically, the headgates were used to divert water into the flume and the mill's turbines for milling, and later electricity production. The water is then returned to the Calapooia River directly below the tailrace. During the rainy season, the head gates release excess water back into the Calapooia River, keeping the mill basement and site from flooding.

Part IV. Sources of Information

Calapooia Watershed Council and River Design Group, Inc. for National Oceanic and Atmospheric Administration National Marine Fisheries Service Office of Habitat Conservation. "Biological Assessment for the Removal of Sodom Dam and Shearer Dam." December 2010.

National Register of Historic Places Nomination Form, Boston Flour Mill, July 9, 1979, Listed August 21, 1979.

Oregon Park and Recreation Department Documents, available at Headquarters Office, 725 Summer St. NE, Salem, OR 97301:

[4] "Thompson Mill", Documentation to comply with Article 9, Project #8169, c.1987.

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Historian(s): Julie Osborne, Preservation Specialist, OPRD, January 2013

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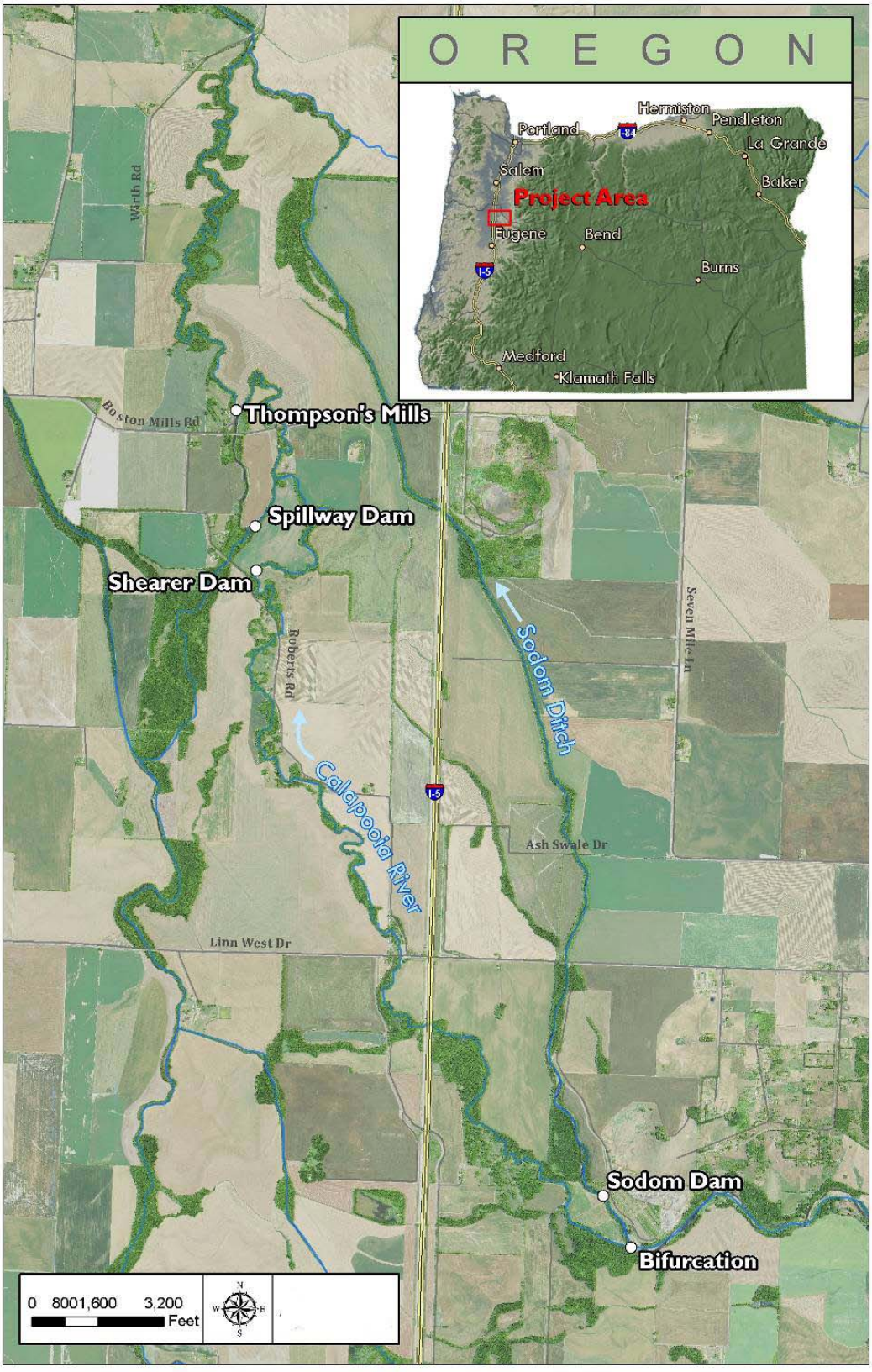
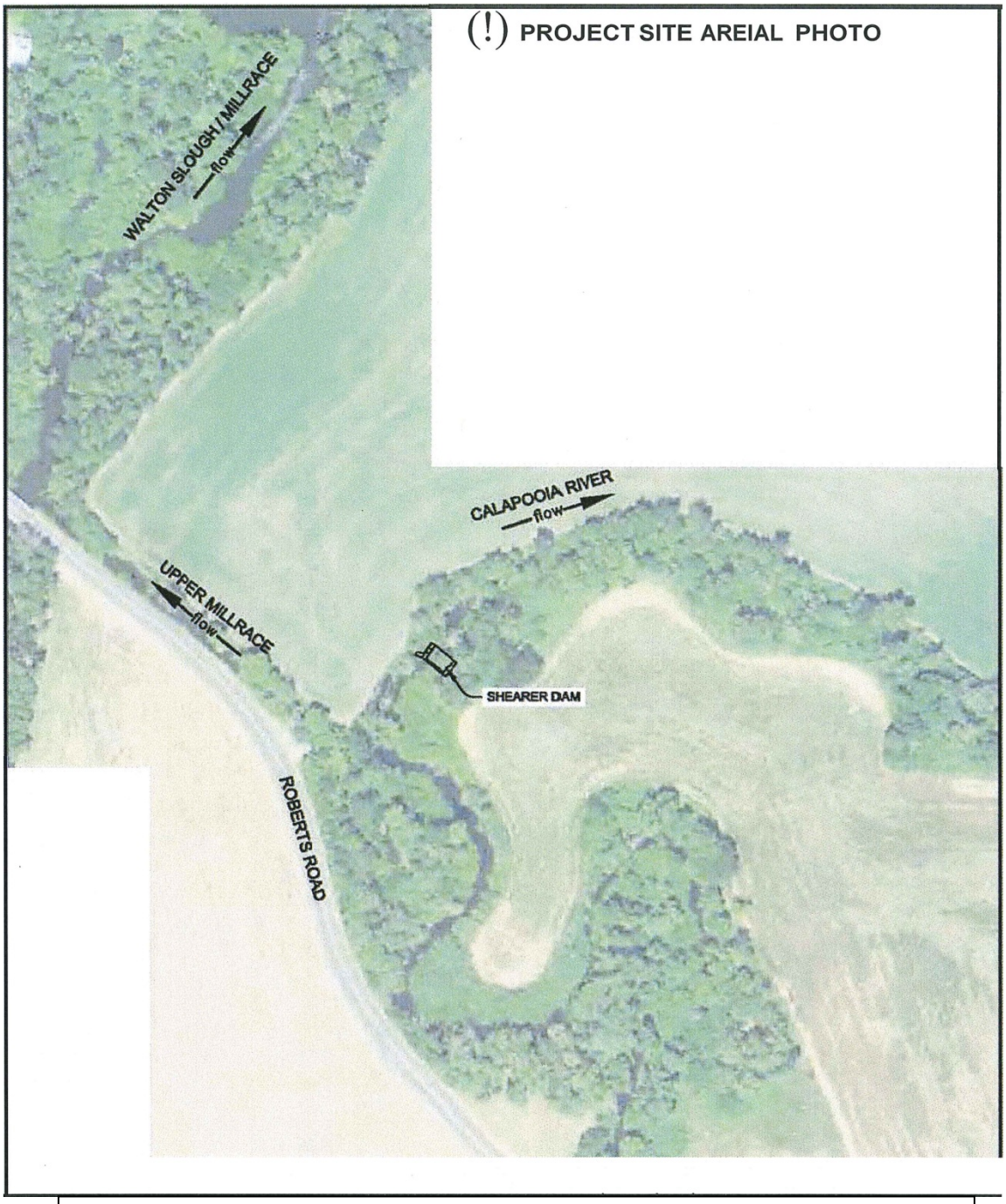
Photographs were taken by James Little, Interpretive Specialist, OPRD.

APPENDIX A – Maps of Waterworks System



Overview Aerial – Water works system

Aerial – Bifurcation, Sodom Ditch, and Sodom Dam



Aerial – Shearer Dam, Upper Millrace Channel, Millrace (Walton Slough)